

3-29-00

A

Practitioner's Docket No. U 012693-7

PATENT

Preliminary Classification:

Proposed Class:

Subclass:

NOTE: "All applicants are requested to include a preliminary classification on newly filed patent applications. The preliminary classification, preferably class and subclass designations, should be identified in the upper right-hand corner of the letter of transmittal accompanying the application papers, for example 'Proposed Class 2, subclass 129.'" M.P.E.P. section 601, 7th ed.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

NEW APPLICATION TRANSMITTAL

Transmitted herewith for filing is the patent application of

Inventor(s): Anthony John OLIVIER; Ferdinand RICHTER; Charles DUCKITT; Ashwin RAMDUTH; Vernon Jeremay ADAMS; Viothoen MOODLEY; Roy Alexander CALDER

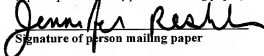
CERTIFICATION UNDER 37 C.F.R. SECTION 1.10*

(Express Mail label number is *mandatory*.)(Express Mail certification is *optional*.)

I hereby certify that this correspondence and the documents referred to as attached therein are being deposited with the United States Postal Service on this date March 28, 2000, in an envelope as "Express Mail Post Office to Addressee," mailing Label Number EL386268165US, addressed to the: Assistant Commissioner for Patents, Washington, D.C. 20231.

JENNIFER RASHKIN

(type or print name of person mailing paper)



(signature of person mailing paper)

WARNING: Certificate of mailing (first class) or facsimile transmission procedures of 37 C.F.R. section 1.8 cannot be used to obtain a date of mailing or transmission for this correspondence.

***WARNING:** Each paper or fee filed by "Express Mail" **must** have the number of the "Express Mail" mailing label placed thereon prior to mailing. 37 C.F.R. section 1.10(b).
"Since the filing of correspondence under section 1.10 without the Express Mail mailing label thereon is an oversight that can be avoided by the exercise of reasonable care, requests for waiver of this requirement will **not** be granted on petition." Notice of Oct. 24, 1996, 60 Fed. Reg. 36,439, at 56,442.

(New Application Transmittal--page 1 of 13) 4-1

EL386268165US

WARNING: 37 C.F.R. section 1.41(a)(1) points out:

"(a) A patent is applied for in the name or names of the actual inventor or inventors.

(1) The inventorship of a nonprovisional application is that inventorship set forth in the oath or declaration as prescribed by section 1.63, except as provided for in section 1.53(d)(4) and section 1.63(d). If an oath or declaration as prescribed by section 1.63 is not filed during the pendency of a nonprovisional application, the inventorship is that inventorship set forth in the application papers filed pursuant to section 1.53(b), unless a petition under this paragraph accompanied by the fee set forth in section 1.17(l) is filed supplying or changing the name or names of the inventor or inventors."

For (title): PROCESS FOR DISTILLING FISCHER-TROPSCH DERIVED PARAFFINIC HYDROCARBONS

1. Type of Application

This new application is for a(n)

(check one applicable item below)

- ☐ Original (nonprovisional)
- ☐ Design
- ☐ Plant

WARNING: *Do not use this transmittal for a completion in the U.S. of an International Application under 35 U.S.C. 371(c)(4), unless the International Application is being filed as a divisional, continuation or continuation-in-part application.*

WARNING: *Do not use this transmittal for the filing of a provisional application.*

NOTE: *If one of the following 3 items apply, then complete and attach ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF A PRIOR U.S. APPLICATION CLAIMED and a NOTIFICATION IN PARENT APPLICATION OF THE FILING OF THIS CONTINUATION APPLICATION.*

- ☐ Divisional.
- ☒ Continuation.
- ☐ Continuation-in-part (C-I-P).

2. Benefit of Prior U.S. Application(s) (35 U.S.C. 119(e), 120, or 121)

NOTE: *A nonprovisional application may claim an invention disclosed in one or more prior filed copending nonprovisional applications or copending international applications designating the United States of America. In order for a nonprovisional application to claim the benefit of a prior filed copending nonprovisional application or copending international application designating the United States of America, each prior application must name as an inventor at least one inventor named in the later filed nonprovisional application and disclose the named inventor's invention claimed in at least one claim of the later filed nonprovisional application in the manner provided by the first paragraph of 35 U.S.C. 112. Each prior application must also be:*

(i) An international application entitled to a filing date in accordance with PCT Article 11 and designating the United States of America; or

(ii) Complete as set forth in section 1.51(b); or

(iii) Entitled to a filing date as set forth in section 1.53(b) or section 1.53(d) and include the basic filing fee set forth in section 1.16; or

(iv) Entitled to a filing date as set forth in section 1.53(b) and have paid therein the processing and retention fee set forth in section 1.21(f) within the time period set forth in section 1.53(f).

37 C.F.R. section 1.78(a)(1).

NOTE If the new application being transmitted is a divisional, continuation or a continuation-in-part of a parent case, or where the parent case is an International Application which designated the U.S., or benefit of a prior provisional application is claimed, then check the following item and complete and attach **ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED**.

WARNING: If an application claims the benefit of the filing date of an earlier filed application under 35 U.S.C. 120, 121 or 365(c), the 20-year term of that application will be based upon the filing date of the earliest U.S. application that the application makes reference to under 35 U.S.C. 120, 121 or 365(c). (35 U.S.C. 154(a)(2) does not take into account, for the determination of the patent term, any application on which priority is claimed under 35 U.S.C. 119, 365(a) or 365(b).) For a c-l-p application, applicant should review whether any claim in the patent that will issue is supported by an earlier application and, if not, the applicant should consider canceling the reference to the earlier filed application. The term of a patent is not based on a claim-by-claim approach. See Notice of April 14, 1995, 60 Fed. Reg. 20,195, at 20,205.

WARNING: When the last day of pendency of a provisional application falls on a Saturday, Sunday, or Federal holiday within the District of Columbia, any nonprovisional application claiming benefit of the provisional application **must** be filed prior to the Saturday, Sunday, or Federal holiday within the District of Columbia. See 37 C.F.R. section 1.78(a)(3).

[X] The new application being transmitted claims the benefit of prior U.S. application(s). Enclosed are **ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED**.

3. Papers Enclosed

A. Required for Filing Date under 37 C.F.R. section 1.53(b) (Regular) or 37 C.F.R. section 1.153 (Design) Application

18 Pages of Specification
3 Pages of Claims
1 Sheets of Drawing

WARNING: **DO NOT** submit original drawings. A high quality copy of the drawings should be supplied when filing a patent application. The drawings that are submitted to the Office must be on strong, white, smooth, and non-shiny paper and meet the standards according to section 1.84. If corrections to the drawings are necessary, they should be made to the original drawing and a high-quality copy of the corrected original drawing then submitted to the Office. Only one copy is required or desired. For comments on proposed then-new 37 C.F.R. 1.84, see Notice of March 9, 1988. (1990 O.G. 57-62).

NOTE: "Identifying indicia, if provided, should include the application number or the title of the invention, inventor's name, docket number (if any), and the name and telephone number of a person to call if the Office is unable to match the drawings to the proper application. This information should be placed on the back of each sheet of drawing a minimum distance of 1.5 cm. (5/8 inch) down from the top of the page. . ." 37 C.F.R. section 1.84(c).

(complete the following, if applicable)

☐ The enclosed drawing(s) are photograph(s), and there is also attached a "PETITION TO ACCEPT PHOTOGRAPH(S) AS DRAWING(S)." 37 C.F.R. section 1.84(b).

☒ Formal

☐ Informal

B. Other Papers Enclosed

____ Pages of declaration and power of attorney

1 Pages of Abstract

____ Other

4. Additional Papers Enclosed

☐ Amendment to claims

☐ Cancel in this applications claims _____ before calculating the filing fee. (At least one original independent claim must be retained for filing purposes.)

☐ Add the claims shown on the attached amendment. (Claims added have been numbered consecutively following the highest numbered original claims.)

☒ Preliminary Amendment

☐ Information Disclosure Statement (37 C.F.R. section 1.98)

☐ Form PTO-1449 (PTO/SB/08A and 08B)

☐ Citations

☐ Declaration of Biological Deposit

☐ Submission of "Sequence Listing," computer readable copy and/or amendment pertaining thereto for biotechnology invention containing nucleotide and/or amino acid sequence.

☐ Authorization of Attorney(s) to Accept and Follow Instructions from Representative

☐ Special Comments

☐ Other

5. Declaration or Oath (including power of attorney)

NOTE: A newly executed declaration is not required in a continuation or divisional application provided the prior nonprovisional application contained a declaration as required, the application being filed is by all or fewer than all the inventors named in the prior application, there is no new matter in the application being filed, and a copy of the executed declaration filed in the prior application (showing the signature or an indication thereon that it was signed) is submitted. The copy must be accompanied by a statement requesting deletion of the names of person(s) who are not inventors of the application being filed. If the declaration in the prior application was filed under section 1.47 then a copy of that declaration must be filed accompanied by a copy of the decision granting section 1.47 status or, if a nonsigning person under section 1.47 has subsequently joined in a prior application, then a copy of the subsequently executed declaration must be filed. See 37 C.F.R. section 1.63(d)(1)-(3).

NOTE: A declaration filed to complete an application must be executed, identify the specification to which it is directed, identify each inventor by full name, including the family name, and at least one given name without abbreviation together with any other given name or initial, and the residence, post office address and country of citizenship of each inventor, and state whether the inventor is a sole or joint inventor. 37 C.F.R. section 1.63(a)(1)-(4).

NOTE: A The inventorship of a nonprovisional application is that inventorship set forth in the oath or declaration as prescribed by section 1.62, except as provided for in section 1.53(d)(4) and section 1.63(d). If an oath or declaration as prescribed by section 1.63 is not filed during the pendency of a nonprovisional application, the inventorship is that inventorship set forth in the application papers filed pursuant to section 1.53(b), unless a petition under this paragraph accompanied by the fee set forth in section 1.17(f) is filed supplying or changing the name or names of the inventor or inventors. 37 C.F.R. section 1.41(a)(1).

☐ Enclosed
Executed by

(check all applicable boxes)

- ☐ inventor(s).
☐ legal representative of inventor(s). 37 C.F.R. section 1.42 or 1.43.
☐ joint inventor or person showing a proprietary interest on behalf of inventor who refused to sign or cannot be reached.

☐ This is the petition required by 37 C.F.R. section 1.47 and the statement required by 37 C.F.R. section 1.47 is also attached. See item 13 below for fee.

☒ Not Enclosed.

NOTE: Where the filing is a completion in the U.S. of an International Application, or where the completion of the U.S. application contains subject matter in addition to the International Application, the application may be treated as a continuation or continuation-in-part, as the case may be, utilizing ADDED PAGE FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION CLAIMED.

☒ Application is made by a person authorized under 37 C.F.R. 1.41 on behalf of all the above named inventor(s).

(The declaration or oath, along with the surcharge required by 37 C.F.R. section 1.16(e), can be filed subsequently).

- ☐ Showing that the filing is authorized.
(not required unless called into question. 37 C.F.R. section 1.41(d))

6. Inventorship Statement

WARNING: If the named inventors are each not the inventors of all the claims an explanation, including the ownership of the various claims at the time the last claimed invention was made, should be submitted.

The inventorship for all the claims in this application are:

- ☐ The same.

or

- ☐ Not the same. An explanation, including the ownership of the various claims at the time the last claimed invention was made,

- ☐ is submitted.
☐ will be submitted.

7. Language

NOTE: An application including a signed oath or declaration may be filed in a language other than English. An English translation of the non-English language application and the processing fee of \$130.00 required by 37 C.F.R. section 1.17(k) is required to be filed with the application, or within such time as may be set by the Office. 37 C.F.R. section 1.52(d).

- ☒ English
☐ Non-English

- ☐ The attached translation includes a statement that the translation is accurate.
37 C.F.R. section 1.52(d).

8. Assignment

- ☐ An assignment of the invention to SHUMANN-SASOL (SOUTH AFRICA) (PROPRIETARY) LIMITED and SULZER CHEMTECH LIMITED

- ☐ is attached. A separate ☐ "COVER SHEET FOR ASSIGNMENT (DOCUMENT) ACCOMPANYING NEW PATENT APPLICATION" or ☐ FORM PTO 1595 is also attached.
☒ will follow.

NOTE: "If an assignment is submitted with a new application, send two separate letters-one for the application and one for the assignment" Notice of May 4, 1990 (1114 O.G. 77-78).

WARNING: A newly executed "STATEMENT UNDER 37 C.F.R. section 3.73(b)" must be filed when a continuation-in-part application is filed by an assignee. Notice of April 30, 1993, 1150 O.G. 62-64.

9. Certified Copy

Certified copy(ies) of application(s)

Country	Appln. no.	Filed
Country	Appln. no.	Filed
Country	Appln. no.	Filed

from which priority is claimed

- ☐ is (are) attached.
☐ will follow.

NOTE: The foreign application forming the basis for the claim for priority must be referred to in the oath or declaration. 37 C.F.R. section 1.55(a) and 1.63.

NOTE: This item is for any foreign priority for which the application being filed directly relates. If any parent U.S. application or International Application from which this application claims benefit under 35 U.S.C. 120 is itself entitled to priority from a prior foreign application, then complete item 18 on the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

10. **Fee Calculation** (37 C.F.R. section 1.16)

A. ☒ Regular application

CLAIMS AS FILED					
Claims	Number Filed	Basic Fee Allowance	Number Extra	Rate	Basic Fee 37 C.F.R. section 1.16(a) \$690.00
<hr/>					
Total Claims (37 C.F.R. section 1.16(c))	11	- 20 =	x	\$ 18.00	
<hr/>					
Independent Claims (37 C.F.R. section 1.16(b))	1	- 3 =	x	\$ 78.00	
<hr/>					
Multiple Dependent Claim(s), if any (37 C.F.R. section 1.16(d))			+	\$260.00	
<hr/>					

- ☐ Amendment cancelling extra claims is enclosed.
☐ Amendment deleting multiple-dependencies is enclosed.
☐ Fee for extra claims is not being paid at this time.

NOTE: If the fees for extra claims are not paid on filing they must be paid or the claims cancelled by amendment, prior to the expiration of the time period set for response by the Patent and Trademark Office in any notice of fee deficiency. 37 C.F.R. section 1.16(d).

Filing Fee Calculation \$ 690.00

B. ☐ Design application
(\$310.00--37 C.F.R. section 1.16(f))

Filing Fee Calculation \$ _____

- C. ☐ Plant application
(\$480.00--37 C.F.R. section 1.16(g))

Filing Fee Calculation \$ _____

11. **Small Entity Statement(s)**

- ☐ Statement(s) that this is a filing by a small entity under 37 C.F.R. section 1.9 and 1.27 is (are) attached.

WARNING: *"Status as a small entity must be specifically established in each application or patent in which the status is available and desired. Status as a small entity in one application or patent does not affect any other application or patent, including applications or patents which are directly or indirectly dependent upon the application or patent in which the status has been established. The refiling of an application under section 1.53 as a continuation, division, or continuation-in-part (including a continued prosecution application under section 1.53(d)), or the filing of a reissue application requires a new determination as to continued entitlement to small entity status for the continuing or reissue application. A nonprovisional application claiming benefit under 35 U.S.C. 119(e), 120, 121, or 365© of a prior application, or a reissue application may rely on a statement filed in the prior application or in the patent if the nonprovisional application or the reissue application includes a reference to the statement in the prior application or in the patent or includes a copy of the statement in the prior application or in the patent and status as a small entity is still proper and desired. The payment of the small entity basic statutory filing fee will be treated as such a reference for purposes of this section." 37 C.F.R. section 1.28(a)(2).*

WARNING: *"Small entity status must not be established when the person or persons signing the . . . statement can unequivocally make the required self-certification." M.P.E.P. section 509.03, 6th ed., rev. 2, July 1996 (emphasis added).*

(complete the following, if applicable)

- ☐ Status as a small entity was claimed in prior application _____, filed on _____ from which benefit is being claimed for this application under:

35 U.S.C. section ☐ 119(e) - provisional,
☐ 120 - continuation,
☐ 121 - divisional,
☐ 365(c) - PCT,

and which status as a small entity is still proper and desired.

- ☐ A copy of the statement in the prior application is included.

Filing Fee Calculation (50% of A, B or C above) \$ _____

NOTE: *Any excess of the full fee paid will be refunded if a small entity status is established refund request are filed within 2 months of the date of timely payment of a full fee. The two-month period is not extendable under section 1.136. 37 C.F.R. section 1.28(a).*

12. **Request for International-Type Search** (37 C.F.R. section 1.104(d))

(complete, if applicable)

- ☐ Please prepare an international-type search report for this application at the time when national examination on the merits takes place.

13. **Fee Payment Being Made at This Time**

- ☒ Not Enclosed

- ☒ No filing fee is to be paid at this time.
(This and the surcharge required by 37 C.F.R. section 1.16(e) can be paid subsequently.)

- ☐ Enclosed

- ☐ Filing fee \$ _____

- ☐ Recording assignment
(\$40.00; 37 C.F.R. section 1.21(h))
(See attached "COVER SHEET FOR
ASSIGNMENT ACCOMPANYING NEW
APPLICATION.") \$ _____

- ☐ Petition fee for filing by other
than all the inventors or person
on behalf of the inventor where
inventor refused to sign or cannot
be reached
(\$130.00; 37 C.F.R. sections 1.47 and 1.17(l)) \$ _____

- ☐ For processing an application with a
specification in a non-English language
(\$130.00; 37 C.F.R. sections 1.52(d) and 1.17(k)) \$ _____

- ☐ Processing and retention fee
(\$130.00; 37 C.F.R. sections 1.53(d) and 1.21(l)) \$ _____

- ☐ Fee for international-type search report
(\$40.00; 37 C.F.R. section 1.21(e)) \$ _____

09537250-032800

NOTE: 37 C.F.R. section 1.21(f) establishes a fee for processing and retaining any application that is abandoned for failing to complete the application pursuant to 37 C.F.R. section 1.53(f) and this, as well as the changes to 37 C.F.R. section 1.53 and 1.78(a)(1), indicate that in order to obtain the benefit of a prior U.S. application, either the basic filing fee must be paid, or the processing and retention fee of section 1.21(f) must be paid, within 1 year from notification under section 53(f).

Total Fees Enclosed

\$ _____

14. Method of Payment of Fees

☐ Check in the amount of \$ _____.

☐ Charge Account No. _____ in the amount of \$ _____.

A duplicate of this transmittal is attached.

NOTE: Fees should be itemized in such a manner that it is clear for which purpose the fees are paid. 37 C.F.R. section 1.22(b).

15. Authorization to Charge Additional Fees

WARNING: If no fees are to be paid on filing, the following items should not be completed.

WARNING: Accurately count claims, especially multiple dependent claims, to avoid unexpected high charges, if extra claim charges are authorized.

☐ The Commissioner is hereby authorized to charge the following additional fees by this paper and during the entire pendency of this application to Account No. _____.

☐ 37 C.F.R. section 1.16(a), (f) or (g) (filing fees)

☐ 37 C.F.R. section 1.16(b), (c) and (d) (presentation of extra claims)

NOTE: Because additional fees for excess or multiple dependent claims not paid on filing or on later presentation must only be paid or these claims cancelled by amendment prior to the expiration of the time period set for response by the PTO in any notice of fee deficiency (37 C.F.R. section 1.16(d)), it might be best not to authorize the PTO to charge additional claim fees, except possibly when dealing with amendments after final action.

☐ 37 C.F.R. section 1.16(e) (surcharge for filing the basic filing fee and/or declaration on a date later than the filing date of the application)

☐ 37 C.F.R. section 1.17(a)(1)-(5) (extension fees pursuant to section 1.136(a).

☐ 37 C.F.R. section 1.17 (application processing fees)

NOTE: "A written request may be submitted in an application that is an authorization to treat any concurrent or future reply, requiring a petition for an extension of time under this paragraph for its timely submission, as incorporating a petition for extension of time for the appropriate length of time. An authorization to charge all required fees, fees under section 1.17, or all required extension of time fees will be treated as a constructive petition for an extension of time in any concurrent or future reply requiring a petition for an extension of time under this paragraph for its timely submission. Submission of the fee set forth in section 1.17(a) will also be treated as a constructive petition for an extension of time in any concurrent reply requiring a petition for an extension of time under this paragraph for its timely submission." 37 C.F.R. section 1.136(a)(3).

☐ 37 C.F.R. section 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 C.F.R. section 1.311(b))

NOTE: Where an authorization to charge the issue fee to a deposit account has been filed before the mailing of a Notice of Allowance, the issue fee will be automatically charged to the deposit account at the time of mailing the notice of allowance. 37 C.F.R. section 1.311(b).

NOTE: 37 C.F.R. section 1.28(b) requires "Notification of any change in status resulting in loss of entitlement to small entity status must be filed in the application . . . prior to paying, or at the time of paying, . . . issue fee." From the wording of 37 C.F.R. section 1.28(b), (a) notification of change of status must be made even if the fee is paid as "other than a small entity" and (b) no notification is required if the change is to another small entity.

16. Instructions as to Overpayment

NOTE: "... Amounts of twenty-five dollars or less will not be returned unless specifically requested within a reasonable time, nor will the payer be notified of such amounts; amounts over twenty-five dollars may be returned by check or, if requested, by credit to a deposit account." 37 C.F.R. section 1.26(a).

☐ Credit Account No. _____

☐ Refund


SIGNATURE OF PRACTITIONER

Reg. No. 25,858

William R. Evans

(type or print name of practitioner)

Tel. No.:(212) 708-1930

c/o Ladas & Parry

26 West 61st Street

P.O. Address

Customer No.:

New York, NY 10023

☒ Incorporation by reference of added pages

(check the following item if the application in this transmittal claims the benefit of prior U.S. application(s) (including an international application entering the U.S. stage as a continuation, divisional or C-I-P application) and complete and attach the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED)

- ☒ Plus Added Pages for New Application Transmittal Where Benefit of Prior U.S. Application(s) Claimed

Number of pages added 5

- ☐ Plus Added Pages for Papers Referred to in Item 4 Above

Number of pages added _____

- ☐ Plus added pages deleting names of inventor(s) named on prior application(s) who is/are no longer inventor(s) of the subject matter claimed in this application.

Number of pages added _____

- ☐ Plus "Assignment Cover Letter Accompanying New Application"

Number of pages added _____

- ☐ **Statement Where No Further Pages Added**

(if no further pages form a part of this Transmittal, then end this Transmittal with this page and check the following item)

- ☐ This transmittal ends with this page.

**ADDED PAGES FOR APPLICATION TRANSMITTAL WHERE BENEFIT OF
PRIOR U.S. APPLICATION(S) CLAIMED**

NOTE: See 37 CFR 1.78.

17. Relate Back

WARNING: If an application claims the benefit of the filing date of an earlier filed application under 35 U.S.C. 120, 121 or 365(c), the 20-year term of that application will be based upon the filing date of the earliest U.S. application that the application makes reference to under 35 U.S.C. 120, 121 or 365(c). (35 U.S.C. 154(a)(2) does not take into account, for the determination of the patent term, any application on which priority is claimed under 35 U.S.C. 119, 365(a) or 365(b).) For a c-i-p application, applicant should review whether any claim in the patent that will issue is supported by an earlier application and, if not, the applicant should consider canceling the reference to the earlier filed application. The term of a patent is not based on a claim-by-claim approach. See Notice of April 14, 1995, 60 Fed. Reg. 20,195, at 20,205.

(complete the following, if applicable)

☒ Amend the specification by inserting, before the first line, the following sentence:**A. 35 U.S.C. 119(e)**

NOTE: "Any nonprovisional application claiming the benefit of one or more prior filed copending provisional applications must contain or be amended to contain in the first sentence of the specification following the title a reference to each such prior provisional application, identifying it as a provisional application, and including the provisional application number (consisting of series code and serial number)." 37 C.F.R. § 1.78(a)(4).

☐ "This application claims the benefit of U.S. Provisional Application(s) No(s).:**APPLICATION NO(S):****FILING DATE**

_____/_____
_____/_____
_____/_____

and incorporates the same by reference."

B. 35 U.S.C. 120, 121 and 365(c)

NOTE: "Except for a continued prosecution application filed under § 1.53(d), any nonprovisional application claiming the benefit of one or more prior filed copending nonprovisional applications or international applications designating the United States of America must contain or be amended to contain in the first sentence of the specification following the title a reference to each such prior application, identifying it by application number (consisting of the series code and serial number) or international application number and international filing date and indicating the relationship of the applications. . . . Cross-references to other related applications may be made when appropriate." (See § 1.14(a)). 37 C.F.R. § 1.78(a)(2).

☒ "This application is a☒ continuation

[] continuation-in-part

[] divisional

of copending application(s)

[] application number _____ filed on _____,

[X] International Application PCT/IB/99/01448 filed on AUGUST 19, 1999 and which designated the U.S.,
claims the benefit thereof and incorporates the same by reference."

NOTE: The proper reference to a prior filed PCT application that entered the U.S. national phase is the U.S. serial number and the filing date of the PCT application that designated the U.S.

NOTE: (1) Where the application being transmitted adds subject matter to the International Application, then the filing can be as a continuation-in-part or (2) if it is desired to do so for other reasons then the filing can be as a continuation.

NOTE: The deadline for entering the national phase in the U.S. for an international application was clarified in the Notice of April 28, 1987 (1079 O.G. 32 to 46) as follows:

"The Patent and Trademark Office considers the International application to be pending until the 22nd month from the priority date if the United States has been designated and no Demand for International Preliminary Examination has been filed prior to the expiration of the 19th month from the priority date and until the 32nd month from the priority date if a Demand for International Preliminary Examination which elected the United States of America has been filed prior to the expiration of the 19th month from the priority date, provided that a copy of the international application has been communicated to the Patent and Trademark Office within the 20 or 30 month period respectively. If a copy of the international application has not been communicated to the Patent and Trademark Office within the 20 or 30 month period respectively, the international application becomes abandoned as to the United States 20 or 30 months from the priority date respectively. These periods have been placed in the rules as paragraph (h) of § 1.494 and paragraph (i) of § 1.495. A continuing application under 35 U.S.C. 365(c) and 120 may be filed anytime during the pendency of the international application."

[] "The nonprovisional application designated above, namely application _____, filed _____, claims the benefit of U.S. Provisional Application(s) No(s).:

APPLICATION NO(S):

FILING DATE

_____/_____
_____/_____
_____/_____

[] Where more than one reference is made above please combine all references into one sentence.

18. Relate Back—35 U.S.C. 119 Priority Claim for Prior Application

The prior U.S. application(s), including any prior International Application designating the U.S., identified above in item 17B, in turn itself claim(s) foreign priority(ies) as follows:

<u>ZA</u>	<u>98/7599</u>	<u>21 AUGUST 1998</u>
Country	Appln. no.	Filed

The certified copy(ies) has (have)

☒ [X] been filed on by WIPO, in prior international application PCT/IB99/01448, which was filed on AUGUST 19, 1999.

☐ [] is (are) attached.

WARNING: *The certified copy of the priority application that may have been communicated to the PTO by the International Bureau may not be relied on without any need to file a certified copy of the priority application in the continuing application. This is so because the certified copy of the priority application communicated by the International Bureau is placed in a folder and is not assigned a U.S. serial number unless the national stage is entered. Such folders are disposed of if the national stage is not entered. Therefore, such certified copies may not be available if needed later in the prosecution of a continuing application. An alternative would be to physically remove the priority documents from the folders and transfer them to the continuing application. The resources required to request transfer, retrieve the folders, make suitable record notations, transfer the certified copies, enter and make a record of such copies in the Continuing Application are substantial. Accordingly, the priority documents in folders of international applications that have not entered the national stage may not be relied on. Notice of April 28, 1987 (1079 O.G. 32 to 46).*

19. Maintenance of Copendency of Prior Application

NOTE: *The PTO finds it useful if a copy of the petition filed in the prior application extending the term for response is filed with the papers constituting the filing of the continuation application. Notice of November 5, 1985 (1060 O.G. 27).*

A. ☐ [] Extension of time in prior application

(This item must be completed and the papers filed in the prior application, if the period set in the prior application has run.)

☐ [] A petition and fee extends the term in the pending **prior** application until _____.

☐ [] A **copy** of the petition filed in prior application is attached.

B. ☐ [] Conditional Petition for Extension of Time in Prior Application

(complete this item, if previous item not applicable)

☐ [] A conditional petition for extension of time is being filed in the pending **prior** application.

☐ [] A **copy** of the conditional petition filed in the prior application is attached.

20. Further Inventorship Statement Where Benefit of Prior Application(s) Claimed

(complete applicable item (a), (b) and/or (c) below)

(a) ☐ [] This application discloses and claims only subject matter disclosed in the prior application whose particulars are set out above and the inventor(s) in this application are

☐ [] the same.

☐ [] less than those named in the prior application. It is requested that the following inventor(s) identified for the prior application be deleted:

(type name(s) of inventor(s) to be deleted)

- (b) ☐ This application discloses and claims additional disclosure by amendment and a new declaration or oath is being filed. With respect to the prior application, the inventor(s) in this application are

☐ the same.

☐ the following additional inventor(s) have been added:

(type name(s) of inventor(s) to be deleted)

- (c) ☐ The inventorship for all the claims in this application are

☐ the same.

☐ not the same. An explanation, including the ownership of the various claims at the time the last claimed invention was made

☐ is submitted.

☐ will be submitted.

21. Abandonment of Prior Application (if applicable)

- ☐ Please abandon the prior application at a time while the prior application is pending, or when the petition for extension of time or to revive in that application is granted, and when this application is granted a filing date, so as to make this application copending with said prior application.

NOTE: According to the Notice of May 13, 1983 (103, TMOG 6-7), the filing of a continuation or continuation-in-part application is a proper response with respect to a petition for extension of time or a petition to revive and should include the express abandonment of the prior application conditioned upon the granting of the petition and the granting of a filing date to the continuing application.

22. Petition for Suspension of Prosecution for the Time Necessary to File an Amendment

WARNING: "The claims of a new application may be finally rejected in the first Office action in those situations where (1) the new application is a continuing application of, or a substitute for, an earlier application, and (2) all the claims of the new application (a) are drawn to the same invention claimed in the earlier application, and (b) would have been properly finally rejected on the grounds of art of record in the next Office action if they had been entered in the earlier application." MPEP, § 706.07(b).

NOTE: Where it is possible that the claims on file will give rise to a first action final for this continuation application and for some reason an amendment cannot be filed promptly (e.g., experimental data is being gathered) it may be desirable to file a petition for suspension of prosecution for the time necessary.

(check the next item, if applicable)

- ☐ There is provided herewith a Petition To Suspend Prosecution for the Time Necessary to File An Amendment (New Application Filed Concurrently)

23. Small Entity (37 CFR § 1.28(a))

☐ Applicant has established small entity status by the filing of a statement in parent application
_____ on _____.

☐ A copy of the statement previously filed is included.

WARNING: See 37 CFR § 1.28(a).

24. NOTIFICATION IN PARENT APPLICATION OF THIS FILING

☐ A notification of the filing of this
(check one of the following)

☐ continuation

☐ continuation-in-part

☐ divisional

is being filed in the parent application, from which this application claims priority under 35 U.S.C. § 120.

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re: Anthony John OLIVIER, et al.

For: PROCESS FOR DISTILLING FISCHER-TROPSCH DERIVED PARAFFINIC
HYDROCARBONS

Attorney Docket: U 012693-7

Commissioner of Patents and Trademarks
Washington, D.C. 20231

PRELIMINARY AMENDMENT

Please amend the above application as follows.

In the Claims

Claim 4, lines 1-2, delete "any one of Claims 1 to 3 inclusive" and
substitute therefor --claim 1--

Claim 7, lines 1-2, delete "any one of Claims 1 to 7 inclusive" and
substitute therefor --claim 1--

CERTIFICATION UNDER 37 C.F.R. 1.10*

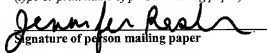
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I hereby certify that this correspondence and the documents referred to as attached therein are being
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JENNIFER RASHKIN

(type or print name of person mailing paper)


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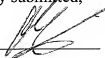
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Mail" mailing label placed thereon prior to mailing. 37 C.F.R. 1.10(b).

EL3.86268165US

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Claim 8, lines 1-2, delete "any one of Claims 1 to 7 inclusive" and
substitute therefor --claim 1--

Respectfully submitted,



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09537250-032800

PROCESS FOR DISTILLING FISCHER-TROPSCH DERIVED PARAFFINIC HYDROCARBONS

THIS INVENTION relates to distillation. More particularly, the invention relates to a process for distilling paraffinic hydrocarbons, particularly Fischer-Tropsch derived paraffinic hydrocarbons.

According to the invention, there is provided a process for distilling paraffinic hydrocarbons, which process comprises feeding a Fischer-Tropsch derived paraffinic hydrocarbon feedstock comprising heavy paraffinic hydrocarbons and, optionally, light and/or medium paraffinic hydrocarbons, into a distillation column; operating the distillation column to produce usable wax products; and

withdrawing from the distillation column an overhead stream, a bottom stream comprising usable wax products, and at least one side stream comprising usable wax products.

The usable wax products are thus Fischer-Tropsch derived. Fischer-Tropsch derived wax products must usually meet stringent specifications for several properties or characteristics. Some of the more important of such properties or characteristics are the congealing point, softness at various temperatures (measured by needle penetration), oil content (measured by the wax product solubility in methyl-ethyl-ketone (MEK) or methyl-isobutyl-ketone (MIBK) solvents) and olefin content (measured using

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a bromine index). Also of importance are DSC (Differential Scanning Calorimetry) curves (these are 'finger prints' of wax showing the energy absorption as a function of temperature) and GPC (Gel Permeation Chromatography) data. GPC data are a measure of molecular weight, the heavy tail and the light ends that are present in a wax.

By 'usable' in respect of the wax products is meant that the wax products are non-thermally degraded. The wax products will also meet the stringent specifications of some or most of the properties or characteristics hereinbefore set out.

By 'Fischer-Tropsch derived' in respect of the paraffinic hydrocarbon feedstock, is meant paraffinic products obtained by subjecting a synthetic gas comprising carbon monoxide (CO) and hydrogen (H₂) to Fischer-Tropsch reaction conditions in the presence of an iron-based, a cobalt-based or an iron/cobalt-based Fischer-Tropsch catalyst.

Prior to using the products from the Fischer-Tropsch reaction as a feedstock for the present process, they may 20 optionally be hydrogenated. Such hydrogenation may be effected by contacting the Fischer-Tropsch reaction products with hydrogen in the presence of a hydrogenation catalyst, at elevated temperature and pressure, in known fashion.

25 Fischer-Tropsch derived wax products are unique since they
are predominantly n-paraffinic with a wide boiling range.
Some isomers, olefins, oxygenates and other functional
groups may also be present. The high n-paraffinic content
of Fischer-Tropsch waxes enables them to meet the stringent
30 specifications hereinbefore referred to. Thermal
degradation, even in its mildest form of less than 2%, will
cause an increase in isomer and olefin content which may
immediately render the wax product non-usable.

The Fischer-Tropsch reaction conditions include using a relatively low reaction temperature in the range 180-300°C, typically 210-260°C, so that a so-called low temperature Fischer-Tropsch synthesis is employed, and the Fischer-Tropsch reaction is typically effected in a fixed or slurry bed reactor.

The feedstock may comprise, in addition to the heavy paraffinic hydrocarbons, the light and the medium paraffinic hydrocarbons. The feedstock could thus typically have a true boiling point curve as indicated in Table 1:

TABLE 1: True boiling point (TBP) curve of a typical Fischer-Tropsch derived feedstock

Mass %	TBP (°C)
1	142
5	169
10	195
30	313
50	417
70	550
90	716
95	757
98	831

The feedstock typically comprises hydrocarbon molecules in the range C_{3+} to C_{220+} . Products with carbon ranges of C_{35-} , C_{10} to C_{80} , and C_{15} to C_{220} or higher, are deemed light, medium and heavy hydrocarbons respectively.

The distillation column can be operated to produce paraffins (C_{23-}), medium wax (C_{20} to C_{38}), and hard wax (C_{30+}) or combinations thereof. All the wax products produced will thus be usable wax products as hereinbefore defined.

Preferably, however, a plurality of side streams are withdrawn from the column, with each side stream comprising

a component of the medium wax and/or a component of the hard wax, and, optionally, a component of the paraffins.

5 The distillation column is preferably operated under vacuum. Operation under vacuum permits a n-paraffinic hydrocarbon to boil at a lower temperature as compared to at atmospheric pressure. The lower temperature decreases, if not eliminates, thermal degradation of the feedstock and the products.

10 The distillation column may be operated such that the pressure in the column is in the range of 1 to 12 mbar(a), typically from 8-10 mbar(a). The temperature in the column sump may then be in the range of 190°C to 350°C, typically in the range of 295°C to 350°C.

15 The process may include feeding stripping steam into the distillation column, to adjust the relative volatility of components in the feedstock. The process may also include feeding one or more of the side streams through a stripping stage. It is envisaged that steam stripping can be used to adjust the front end volatility of the products, thereby to aid in product quality.

20 The distillation column will thus have a suitable internal arrangement. The internal arrangement may comprise trays or packing as distillation media. However, for vacuum distillation applications, the pressure drop over the required number of theoretical stages should be minimized to prevent or inhibit thermal degradation of distilled products. Additionally, packing generally results in lower pressure drops than trays for the same number of theoretical stages and the same vapor/liquid traffic in the distillation column. According to Distillation Design, by Henry Z. Kister, McGraw Hill, 1992 (hereinafter also referred to as 'Kister'), a vacuum distillation column with ten theoretical stages and operating at a 1 psi (about

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70 mbar) top pressure, has a bottom pressure of 2,5 psi (about 175 mbar) when fitted with trays; however, the bottom pressure is only 1,4 psi (about 100 mbar) when it contains packing.

Packing is thus preferred as distillation medium. The packing may be random or dumped packing, ie, according to Kister, discrete pieces of packing of a specific geometrical shape and which are dumped or randomly packed into the column; structured or systematically arranged packing, ie, according to Kister, crimped layers of wire mesh or corrugated sheets, with sections of such packing then being stacked in the column; and grid packing, ie, according to Kister, systematically arranged packing, but having an open-lattice structure rather than being in the form of wire mesh or corrugated sheets. The preferred internal arrangement comprises structured packing, in view of its superior balance of efficiency, capacity and pressure drop as compared to the other packings hereinbefore described.

The structured packing may have a surface area (in m^2) to volume (in m^3) ratio of 125:1 to 750:1, e.g. 250:1, 350:1 or 500:1, or any other intermediate value.

As indicated hereinbefore, a plurality of the side streams may be provided, with the distillation column including a draw point or zone for each of the side streams as well as for the overhead and bottom streams, and with a plurality of distillation stages being provided in the distillation column, with each stage being located between the draw points or zones for two of the streams. Each stage may thus comprise the structured packing.

This packing and column internal arrangement produces a very low pressure drop and decreases entrainment while ensuring that the required separation is achieved. This

low pressure drop permits the addition of more column side draws or theoretical stages than would be the case if different column internals with higher pressure drops were to be used.

Typically, five theoretical stages are provided per bed of packing, with the respective beds each containing the packing and the internal arrangement, and each bed being located between draw points for the overhead, side and bottom streams from the column. The packings of the various beds and stages can have the same surface area to volume ratios, or the surface area to volume ratios of the packings of at least some of the beds and/or stages can be different. The internal arrangement minimizes the residence time within the distillation column, thus reducing the amount of thermal cracking of the products produced.

The process of the invention thus employs multiple side streams with separation stages in the column between the withdrawal of the side streams, to split wax fractions.

Thermal degradation can be further countered by cooling down the bottom stream, and recycling a small proportion, typically less than 10% by volume, of the cooled bottoms product to the column sump to quench the sump content. This can be done without appreciably effecting the front end cut of the column bottoms product or the tail end of the column side stream or draw-off immediately above the column bottoms product, ie the stringent specifications hereinbefore referred to can still be met.

With the process of the invention, the Fischer-Tropsch derived feedstock is thus fractionated into product streams having unique properties or characteristics. One of these properties is the congealing point, which can thus be used to control the operation of the distillation column.

However, instead, or additionally, other unique properties, such as methyl-ethyl-ketone (MEK) and/or methyl-isobutyl-ketone (MIBK) solubles (also referred to as the oil content), penetration at a particular temperature, which is normally in the range of 25°C to 60°C, carbon distributions, etc. can be used to control distillation operation. The number of side streams from the column are determined by the properties of the products and by-product purity desired. There is, in principle, no restriction on the maximum number of side stream product draws other than the fact that the accumulated pressure drop of the internals must be limited.

It was surprisingly found that with the unique process according to the invention, Fischer-Tropsch feedstocks can be distilled into usable wax products in a single column that has one or more side streams. The use of the low pressure drop internals, stripping stream and/or the quenching of the contents of the column sump using cooled column bottoms product, inhibits or counters thermal degradation of the usable wax products.

The invention will now be described by way of example, with reference to the accompanying drawing and non-limiting example.

In the drawing, reference numeral 10 generally indicates, in simplified flow diagram form, a process according to the invention for distilling paraffinic hydrocarbons.

In the drawing, reference numeral 10 generally indicates a process according to the invention, for distilling a Fischer-Tropsch derived light, medium and heavy paraffinic hydrocarbon feedstock.

The process 10 includes a distillation column 12 having six vertically staggered packing stages 14, 16, 18, 20, 22 and

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24. Each packing stage comprises high performance structured packing and associated internals such as structured packing having a surface area (in m^2) to volume (in m^3) ratio of 125:1, 250:1, 350:1, 500:1 or 750:1, or any appropriate intermediate value.

A feed line 26 leads into the bottom of the distillation column 12, as does a stripping steam feed line 28. Into the line 26 leads a light (C_{20-}) hydrocarbon line 30, a medium ($C_{10} - C_{40}$) hydrocarbon line 32 and a heavy ($C_{15} - C_{220+}$) hydrocarbon line 34.

The feed line 26 and the stripping steam feed line 28 lead into the column below the lowermost packing stage 14.

A bottoms line 36 leads from the bottom of the column 12.

A side stream line 38 leads from the column between the packing stages 14, 16 to a stripping column 40, with a stripping steam line 42 leading into the bottom of the column 40. The column 40 comprises a packing stage 44 comprising sieve trays. A product line 46 leads from the bottom of the column 40, while a return line 48 leads from the top of the column 40. The return line 48 returns to the column 12 between the packing stages 16, 18.

A side stream withdrawal line 50 leads from the distillation column between the packing stages 16, 18 into a stripping column 52 having a packing stage 54 comprising sieve trays. A product withdrawal line 56 lead from the bottom of the column 52, while a return line 58 leads from the top of the column 52 back to the distillation column 12 between the packing stages 18, 20.

A side stream withdrawal line 60 leads from the column 12 between the packing stages 18, 20. The line 60 leads into the top of a stripping column 62 having a packing stage 64

comprising sieve trays. A product withdrawal line 66 leads from the bottom of the column 62, while a return line 68 leads from the top of the column 62 back to the distillation column 12 between the packing stages 20, 22.

- 5 A side stream withdrawal line 70 leads from the distillation column 12 between the packing stages 20, 22. The line 70 leads into a stripping column 72 having a packing stage 74 comprising sieve trays. A product withdrawal line 76 leads from the bottom of the column 72, while a return line 78 leads from the top of the column 72 back to the distillation column 12, between the packing stages 22, 24.

- 10 A side stream/product withdrawal line 80 leads from the distillation column 12 between the packing stages 22, 24, and is fitted with a recycle line 82 returning to the distillation column 12 above the packing stage 24.

An overheads line 84 leads from the top of the column.

- 15 In use, a Fischer-Tropsch derived light, medium and heavy hydrocarbon feedstock is fed, along the flow line 26, into the bottom of the distillation column 12. The distillation column 12 is typically operated at a pressure of 8-10 mbar(a) and at a temperature, measured in the column sump, of about 295-300°C.

- 20 Usable wax products, such as medium wax ($C_{20} - C_{38}$) and hard wax (C_{30+}) are produced in the column 12.

The products withdrawn along the lines 36, 46, 56, 66, 76, 80 and 84 typically comprise C_{35+} , $C_{25} - C_{40}$, $C_{20} - C_{30}$, $C_{19} - C_{23}$, $C_{18} - C_{20}$, C_{17-} and C_{5-} respectively.

- 25 Stripping steam lines 86 lead into the bottoms of each of these stripping columns 52, 62, 72.

The following non-limiting examples were also conducted, in simulations of the process 10:

EXAMPLE 1

The feedstock entering the column 12 along the line 26 comprised light hydrocarbons (also known and referred to as Cold Condensate (CC)), medium hydrocarbons (also known and referred to as Hot Condensate (HC)) and heavy hydrocarbons (also known and referred to as Reactor Waxes (RW)). All the hydrocarbons were Fischer-Tropsch derived. Thus, each component of the feedstock was a blend of the respective products from both fixed and slurry bed reactor Fischer-Tropsch processes. The blend ratio (mass basis) in this example was:

CC	=	28,8%
HC	=	17,2%
RW	=	54,0%

The number of side streams from the column 12 are determined by the properties of the product or the by-product purity desired.

There is no restriction on the maximum number of side product streams other than the fact that the accumulated pressure drop of the internals must be limited. If unlimited, energy loss and thermal cracking can be so significant that the process becomes technologically and/or economically non-viable.

Table 2 hereunder shows the streams produced, the desired congealing point (CP) range and typical CP values obtained.

TABLE 2

	Product	Name	CP Desired Range (°C)	Typical CP obtained (°C)	Carbon No Range
Overhead Stream 84	C ₅₋	Gas	n/a	n/a	5 max
Stream 80	C ₁₇₋	C ₁₇ -Paraffins	n/a	n/a	4-18
Stream 76	C ₁₈ -C ₂₀	C ₁₈ -C ₂₀ Paraffins	25-30	28	17-21
Stream 66	C ₁₉ -C ₂₃	Waksol	35-40	38	18-24
Stream 56	C ₂₀ -C ₃₀	Medium Wax 1	50-55	53	19-30
Stream 46	C ₂₅ -C ₄₀	Medium Wax 2	60-65	64	25-40
Bottom Stream 36	C ₃₅₊	Hard Wax	65 +	98	35-220

The yield of the above streams on a mass basis as a percentage of the feed was approximately:

Overhead Stream 84	=	1,0%
Stream 80	=	27,6%
Stream 76	=	5,8%
Stream 66	=	4,5%
Stream 56	=	6,9%
Stream 46	=	11,4%
Bottom Stream 36	=	42,8%

The column 12 was operated at a head pressure of 5 mbar(a) using a three stage steam ejector for its vacuum system. The pressure drops achieved over the 6 beds of structured packing was 25 mbar. Each bed of packing comprised Mellapak 250Y (trade mark) packing available from Sulzer Chemtech Ltd, PO Box 65, CH-8404, Winterthur, Switzerland. Some side streams had side stripper columns as indicated in the drawing. Low pressure (2,4 barg) steam was injected into both the bottom of the main fractionator and the side stripper columns to aid in separation.

EXAMPLE 2

The feedstock entering the column 12 along the line 26 had the following composition:

	RW	=	79% by mass
5	HC	=	21% by mass

The products obtained are given in Table 3.

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TABLE 3

ANALYSES	UNITS	TEST METHOD	GAS C5-		C17-PARAFFINS		WAXY OIL	
			Spec	Typical	Spec	Typical	Spec	Typical
Coagulation Point	°C	ASTM D338	-	-	-	-	26-30	28
Cloud Point	°C	SASOL	-	-	-	-	-	-
Penetration at 25°C 40°C 60°C	0.1 mm 0.1 mm 0.1 mm	ASTM D1321 ASTM D1321 ASTM D1321	-	-	-	-	-	-
MEK Solubles	mass %	ASTM D721	-	-	-	-	22 max	15
MIBK Solubles	mass %	ASTM D721	-	-	-	-	-	-
Savbalt Color (ASTM)	-	ASTM D156	-	-	-	-	+ 10 min	+ 20
Bromine Index	g Br/100g	SASOL	-	-	-	-	10 max	7
DSC Analyses: Melt range Maximum Fusion Enthalpy	°C °C J/g	SASOL	-	-	-	-	-	-
GPC Analyses: Mn Mw Mz Pd	Daltons Daltons Daltons Daltons	SASOL	-	-	-	-	-	276 272 278 1.0
ASTM D2887 Data: IBP 5% 50% 95% FBP	°C °C °C °C °C	ASTM D2887	-	-	-	-	280-300 355-375	288 286 328 363
Carbon Distribution: Range Peak > C17 Iso-paraffins	C number C number mass % mass %	SASOL	-	-	4-18 12-13 0, 15max	5-18 13 0, 1	-	13-23 22 -

Table 3/.....cont

TABLE 3 (cont)

ANALYSES	UNITS	TEST METHOD	MEDIUM WAX 1 + 2 BLEND		HARD WAX	
			Spec	Typical	Spec	Typical
Coagulation Point	°C	ASTM938	56-60	57	96-100	97
Cloud Point	°C	SASOL	72 max	62	-	-
Penetration at 25 °C 10 mm 68 °C	0.1mm 0.1mm 0.1mm	ASTM D1321 ASTM D1321 ASTM D1321	24-32 120-130	26 128	1max 25max	<1 20
MEK Solubles	mass %	ASTM D721	3.2-4.2	4.0	-	-
MIBK Solubles	mass %	ASTM D721	-	-	1.5max	0.8
Saybolt Color (ASTM)	-	ASTM D156	+10min	+20	+15min	+17
Bromine Index	g Br/100g	SASOL	1max	0.5	1max	<0.1
DSC Analyses: Melt range Maximum Fusion Enthalpy	°C °C J/g	SASOL	3-7/58-63 53-56 180-189	6/60 54 188	19-22/111-114 76-78/100-102 228-237	21/112 77/101 232
GPC Analyses: Mn Mw Mz Pd	Daltons Daltons Daltons Daltons	SASOL	351-379 363-391 370-398 1,0-1,1	365 365 372 1,0	636-664 799-827 1120-1148 1,2max	650 813 1134 1,1
ASTM D2887 Data: IBP 5% 50% 95% FBP	°C °C °C °C	ASTM D2887	345-365 485-505	356 412 490	465-485 - -	475 636 819
Carbon Distribution: Range Peak >C17 Iso-paraffins	C number C number mass % mass %	SASOL	- - 8max	19-40 - 5,9	- - 4max	30-220 - 3,2

Gas C5: = 0.1
C17- Paraffins = 5.1
Waxy Oil = 11.8

Medium Wax 1 for Blend = 12.7
Medium Wax 2 for Blend = 12.7
Hard Wax = 57.6

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The column sump temperature was 300°C, and the head pressure was 5 mbar(a). The pressure drop achieved over the six beds of Mellapak 250Y packing was 15 mbar(a). All wax products met the stringent specifications for Fischer-Tropsch products and were consequently usable, as indicated in Table 3 above.

EXAMPLE 3

The feedstock entering the column 12 along line 26 had the following composition:

10	HC	=	21% by mass
	RW	=	79% by mass

The products obtained are given in Table 4.

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TABLE 4

ANALYSES	UNITS	TEST METHOD	GAS C5-		C17-PARAFFINS		WAXY OIL	
			Spec	Typical	Spec	Typical	Spec	Typical
Congealing Point	°C	ASTM D338	-	-	-	-	26-30	28
Cloud Point	°C	SASOL	-	-	-	-	-	-
Penetration at 25°C 40°C 65°C	0.1mm 0.1mm 0.1mm	ASTM D1321 ASTM D1321 ASTM D1321	-	-	-	-	-	-
MEK Solubles	mass %	ASTM D721	-	-	-	-	22 max	15
MIBK Solubles	mass %	ASTM D721	-	-	-	-	-	-
Saybolt Color (ASTM)	-	ASTM D156	-	-	-	-	+10 min	+20
Bromine Index	g Br/100g	SASOL	-	-	-	-	10 max	7
DSC Analyses: Melt range Maximum Fusion Enthalpy	°C °C J/g	SASOL	-	-	-	-	-	-
GPC Analyses: Mn Mw Mz Pd	Daltons Daltons Daltons Daltons	SASOL	-	-	-	-	-	276 272 278 1.0
ASTM D2887 Data: IBP 5% 50% 95% FBP	°C °C °C °C	ASTM D2887	-	-	-	-	280-300 355-375	288 328 363
Carbon Distribution: Range Peak >C17 Iso-paraffins	C number C number mass % mass %	SASOL	-	-	4-18 12-13 0.15max	5-18 13 0.1	-	13-23 22

Table 4/.....cont

TABLE 4 (cont)

ANALYSES	UNITS	TEST METHOD	MEDIUM WAX 1 + 2		MEDIUM WAX 3		HARD WAX	
			Spec	Typical	Spec	Typical	Spec	Typical
Coagulating Point	°C	ASTM D938	56-60	58	74-78	76	97-100	99
Cloud Point	°C	SASOL	72 max	65	85max	82	-	-
Penetration at 25°C 0.1mm 40°C 0.1mm 65°C	0.1mm 0.1mm 0.1mm	ASTM D1321 ASTM D1321 ASTM D1321	24-32 120-130	26 126	15max	14	1max 19max	<1 13
MEK Solubles	mass %	ASTM D721	3.2-4.2	3.9	15max	1.3	-	-
MIBK Solubles	mass %	ASTM D721	-	-	-	-	1.0max	0.4
Saybolt Color (ASTM)	-	ASTM D156	+ 10min	+ 19	+ 10min	+ 17	+ 10min	+ 14
Bromine Index	g Br/100g	SASOL	1max	0.5	1max	0.4	0.5max	0.2
DSC Analyses Melting Maximum Fusion Enthalpy	°C J/g	SASOL	3-7/58-63 53-56 180-189	6/63 54 188	-	21-78 67 205	30-34/113-118 84-88/102/107 230-240	33/117 86/106 235
GPC Analyses: Mn Mw Mz Pd	Daltons Daltons Daltons Daltons	SASOL	351-379 363-391 370-398 1.0-1.1	365 377 384 1.0	-	448 463 477 1.0	740-770 910-940 1208-1238 1.2max	755 925 1223 1.1
ASTM D2887 Data: IBP 50% 95% FBP	°C °C °C °C	ASTM D2887	345-365 485-505	359 420 496	460-480 590-615	469 595	530min	540 676 830
Carbon Distribution: Range >C17 Iso-paraffins	C number C number C number mass %	SASOL	-	19-41	-	30-55	-	45-220
Product Yields: (mass %)	Gas C5 C17-Paraffins Waxy Oil	= 0.1 = 5.1 = 11.8	-	5.9	6max	4.5	4max	3.0
					Medium Wax 1 for Blend Medium Wax 2 for Blend Medium Wax 3 Hard Wax			

The column sump temperature was 330° and the head pressure was 5 mbar(a). The pressure drop achieved over the six beds of Mellapak 250Y packing was 15 mbar(a). All the wax products met the stringent specifications for Fischer-Tropsch products and were consequently usable, as indicated in Table 4 above.

The process 10 permits a light, medium and heavy Fischer-Tropsch derived feedstock to be distilled into normal usable product ranges using a single column with multiple product side streams. This has hitherto not been possible due to high pressure drops associated with conventional packing used in distillation columns. The wax products produced are usable wax products.

15 The process 10 is capable of producing a wide range of narrow cuts, and also has substantial flexibility.

CLAIMS

1. A process for distilling paraffinic hydrocarbons, which process comprises

feeding a Fischer-Tropsch derived paraffinic hydrocarbon feedstock comprising heavy paraffinic hydrocarbons and, optionally, light and/or medium paraffinic hydrocarbons, into a distillation column;

operating the distillation column to produce usable wax products; and

withdrawing from the distillation column an overhead stream, a bottom stream comprising usable wax products, and at least one side stream comprising usable wax products.

2. A process according to Claim 1, wherein the Fischer-Tropsch derived paraffinic hydrocarbon feedstock comprises, in addition to the heavy paraffinic hydrocarbons and which comprise hydrocarbon molecules with carbon numbers or carbon atoms in the range C_{15} and greater, also medium paraffinic hydrocarbons comprising hydrocarbon molecules with carbon numbers in the range C_{10} to C_{80} , and light paraffinic hydrocarbons comprising hydrocarbon molecules with carbon numbers in the range C_{35} and less.

3. A process according to Claim 2, wherein the operation of the distillation column is such that it produces, as the usable wax products, hard wax comprising hydrocarbon molecules with carbon numbers in the range C_{30} and greater, and medium wax comprising hydrocarbon molecules with carbon numbers in the range C_{20} to C_{38} , with the distillation column also producing paraffins comprising hydrocarbon molecules with carbon numbers in the range C_{23} and less.

4. A process according to any one of Claims 1 to 3 inclusive, wherein the distillation column is operated under vacuum.

5. A process according to Claim 4, wherein the distillation column has a sump, with the distillation column being operated such that the pressure in the column is from 1 to 12 mbar(a), and the temperature in the column sump is from 190°C to 350°C, and with the bottom stream being withdrawn from the sump.

10 6. A process according to Claim 5, which includes cooling the bottom stream, and recycling up to 10% by volume of the bottom stream to the sump, as a sump quench.

15 7. A process according to any one of Claim 1 to 6 inclusive, which includes feeding stripping steam into the distillation column, to adjust the relative volatility of components in the feedstock.

20 8. A process according to any one of Claims 1 to 7 inclusive, wherein the distillation column contains structured packing as a distillation medium, with the structured packing having a surface area (in m²) to volume (in m³) ratio of 125:1 to 750:1.

25 9. A process according to Claim 8, wherein a plurality of the side streams are provided, with the distillation column including a draw point or zone for each of the side streams as well as for the overhead and bottom streams, and with a plurality of distillation stages being provided in the distillation column, with each stage being located between the draw points or zones for two of the streams, and with each stage comprising the structured
30 packing.

10. A process according to Claim 9, wherein the structured packings of the different stages have the same surface area to volume ratios.

- 5 11. A process according to Claim 9, wherein the structured packings of at least some of the stages have different surface area to volume ratios.

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